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## (54) Coated snack comprising 8-16% milk solids

(57) A snack to be eaten with the fingers by toddlers comprising from 8 to 16% of whole milk solids and consisting of a body, obtainable by cooking-extrusion-expansion of a cereal based mixture, coated with a sugar based slurry.

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## Description

[0001] The present invention relates to a snack to be eaten with the fingers by toddlers and to a process for manufacturing a snack of this kind.

[0002] US4650685 (Persson et al.) discloses a biscuit comprising agglomerated granules of a cooked-extruded base coated with a binder, the base comprising from 40 to 80 parts by weight of cereal flour, up to 20 parts sucrose and from 0.5 to 3 parts of oil or fat, and the binder comprising from 8 to 30 parts by weight of sucrose and/or mixtures of glucose and its polymers.

[0003] JP01174322 (QP CORP) discloses a drop or cookie for babies and infants obtained by baking a dough consisting of starch, saccharides and milk, containing a powder of fruit juice but no egg material.

[0004] US4044159 (Lutz) discloses a ready-to-eat expanded cereal product in the form of thin flakes, suitable for the feeding of junior-age infants, obtained by cooking-extruding-expanding a moist blend comprising cereal grain, slicing the expanded rope of cooked-extruded blend into flakes and drying the flakes.

[0005] WO89/04121 (HEINZ SCHAAF OHG) discloses a process for manufacturing cereals, especially for babies, by cooking-extruding a mixture of cereal material, vegetable and/or fruits with a partial amount of sugar and milk, cutting the expanded rope of cooked-extruded mixture into pieces having a large surface, spraying an aqueous suspension of sugar and milk onto the just cut, hot and moist pieces, coating the moistened pieces with a remaining part of components in powder form and drying the coated pieces.

[0006] WO93/17592 (SCHAAF TECHNOLOGIE GMBH) discloses a process and an apparatus for cooking-extruding-expanding vegetable and/or fruit containing cereals, in which expansion is carried out in a large expansion zone provided for after an extrusion zone and before a cutting zone.

[0007] An object of the present invention is to provide a new type of snack to be eaten with the fingers by toddlers, obtainable by cooking-extrusion-expansion and coating, which is rather large and attractive in shape, colour and taste while being dietetically adequate, as well as a process for manufacturing such a snack.

[0008] To this end, the present snack to be eaten with the fingers by toddlers comprises, in % by weight of the snack, from 8 to 16% of whole milk solids, from 1 to 8% of dietary fibers and from 1.0 to 2.5% of water, and consists of a coated body, the body being obtainable by cooking-extrusion-expansion of a mixture comprising, in % by weight of the mixture, from 8 to 16% of whole milk powder, from 3 to 5% of vegetable fat, from 35 to 50% of corn semolina, up to 30% of other cereal flour, up to 10% of cereal bran, from 20 to 30% of starch and added water up to a water content of from 13 to 18%, and the body being coated by a coating obtainable by spraying onto the body and drying a slurry comprising, in % by weight of the slurry, from 30 to 60% of a fruit or vegeta-

ble puree or concentrate, from 10 to 30% of sugar, from 10 to 25% of whole milk powder and added water up to a water content of from 20 to 30%.

[0009] The present process for manufacturing a snack to be eaten with the fingers by toddlers comprises manufacturing a body by cooking-extruding-expanding at 135 to 150°C under 130 to 160 bar a mixture comprising, in % by weight of the mixture, from 8 to 16% of whole milk powder, from 3 to 5% of vegetable fat, from 35 to 50% of corn semolina, up to 30% of other cereal flour, up to 10% of cereal bran, from 20 to 30% of starch and added water up to a water content of from 13 to 18%, coating the body by spraying thereon a slurry comprising, in % by weight of the slurry, from 30 to 60% of a fruit or vegetable puree or concentrate, from 10 to 30% of sugar, from 10 to 25% of whole milk powder and added water up to a water content of from 20 to 30%, and drying the coated body down to a residual water content of from 1.0 to 2.5%.

[0010] Thus, in the present context, the expression "being dietetically adequate" may be understood as designating a snack based on cereal semolina and/or flour especially comprising, in % by weight, from 8 to 16% of whole milk solids and from 1 to 8% of dietary fibers.

[0011] However, as a whole, beside from 1 to 8% of dietary fibers and from 1.0 to 2.5% of residual water, the snack may generally comprise, in % by weight of the snack, from 6 to 10% of protein, from 60 to 80% of available carbohydrates and from 6 to 9% of fat, for example.

[0012] The expression "other cereal" means cereal different from corn.

[0013] It has surprisingly been found that problems encountered especially in the matter of expansion, texture and colour of the snack while trying to achieve the above mentioned object of the present invention were best solved with the snack and the process as above defined.

[0014] It has especially been found that the milk solids may better be incorporated into the snack in two parts, a first part being incorporated into the body and a second part being incorporated into the coating. In this way it is possible to obtain an expanded snack which has a smooth, crunchy but not hard texture and which has a rather bright colour.

[0015] Preferably, out of 100% by weight milk solids in the snack, about 55 to 65% belong to the body and about 35 to 45% belong to the coating.

[0016] The mixture to be treated by cooking-extrusion-expansion thus comprises, in % by weight of the mixture, from 8 to 16% of whole milk powder. It has namely been found that more than 16% of whole milk powder in the mixture result in a too hard texture and in a too dark colour.

[0017] The mixture further comprises from 3 to 5% of vegetable fat which acts as a lubricating agent in the cooking-extrusion process and which preferably is a well keeping fat having a rather high level of oleic acid

such as sunflower oil, for example.

[0018] The mixture also comprises from 35 to 50% of corn semolina which is necessary for obtaining a good expansion which may be illustrated by a preferred expansion degree of the body of from about 2 to about 5, for example.

[0019] The mixture also comprises up to 30% of other cereal flour and possibly up to 10% of cereal bran. The so called other cereal may be wheat or oat, for example. The cereal bran may be wheat bran, corn bran and/or oat bran, for example. Depending on its extraction grade, a contribution to the final content of the snack in dietary fibres can also be made by a flour, especially an oat flour or whole wheat flour, and not only if at all by a bran, for example.

[0020] The mixture also comprises from 20 to 30% of starch which also is necessary for obtaining a good expansion. A suitable starch may be a cereal starch such as wheat or corn starch, but it is preferably a high amylopectine starch such as waxy corn starch, for example.

[0021] The mixture also comprises added water up to a water content of from 13 to 18%. Such a water content is adequate for obtaining a correct expansion after cooking-extrusion of the mixture.

[0022] The mixture may further comprise up to about 0.5% of a raising agent, namely a food grade chemical compound able to release carbon dioxide in contact with water, such as calcium carbonate, for example.

[0023] Finally, the mixture may also further comprise up to about 1.0% of an antioxidant such as sodium biphosphate anhydride, for example.

[0024] The slurry to be sprayed onto the body thus comprises, in % by weight of the slurry, from 30 to 60% of a fruit or vegetable puree or concentrate. The fruit or vegetable may be banana, orange, apple and/or carrots, for example.

[0025] The slurry also comprises from 10 to 30% of sugar. The sugar may be sucrose, fructose and/or a product of enzymatical saccharification of starch, for example.

[0026] The slurry also comprises from 10 to 25% of whole milk powder. It has namely been found that more than 25% whole milk powder enhances too much the viscosity of the slurry.

[0027] The slurry finally comprises added water up to a water content of from 20 to 30%. Such a water content together with a preferred temperature of the slurry of from about 45 to 55°C have been found to be especially adequate for manipulating the slurry while avoiding both microbial contamination and Maillard reaction.

[0028] For carrying out the process according to the present invention, a body is thus manufactured by cooking-extruding-expanding at 135 to 150°C under 130 to 160 bar a mixture having the composition disclosed above. For carrying out this first manufacturing step, any traditional extruder may be used, while a twin screw extruder is preferred. This extruder preferably should

comprise an extrusion die provided with at least one rather large extrusion opening having the shape of a fruit, a vegetable or a familiar item, for example.

[0029] Preferably the body is cooked-extruded-expanded to an expansion degree of from 2 to 5. Water is lost in form of steam escaping the mixture during expansion so that the body may have a water content of between about 4 to 8% after the cooking-extrusion-expansion step, for example.

[0030] In order to be able to reach a very low moisture of the end product, it is advisable to provide for an intermediate drying step of the body at this stage, before coating the body with the slurry.

[0031] Such an intermediate drying step may be carried out on a belt drier with hot air down to a residual water content of less than about 1%, for example.

[0032] The step of coating the body by spraying thereon a slurry having the composition disclosed above may be carried out in a cylindrical tumbler rotating around its generally horizontal axis and being provided inside with spraying nozzles. Preferably located in an upper part of the cylindrical internal space defined by the tumbler wall, such nozzles may spray the slurry downwards onto the tumbled bodies, for example.

[0033] Then, the just coated body is dried down to a residual water content of from 1.0 to 2.5% by weight.

[0034] This drying step may also be carried out on a belt drier with hot air, for example.

[0035] The snack thus obtained may be conditioned in a packing providing for its protection against humidity, such as a packing made of a film with aluminium foil, for example.

[0036] The following example is given as illustration of an embodiment of the snack and an embodiment of the process for its manufacture according to the present invention. The parts and percentages are by weight.

#### Example

[0037] For manufacturing a snack having a banana shape and taste, which is to be eaten with the fingers by toddlers, a mixture was first prepared which had the following composition, in % by weight of the mixture:

Corn semolina	40.10%
Waxy corn starch	23.43%
Whole wheat flour	10.13%
Oat flour	7.59%
Whole milk powder (25% fat)	11.20%
Sodium biphosphate anhydride	0.95%
Calcium carbonate E 170	0.30%
Sunflower oil	3.00%

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Added water	3.30%
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[0038] For preparing the mixture, the powders were first mixed together to obtain a dry mix. The dry mix, oil and added water were then mixed together in the extruder. The mixture obtained in this way was cooked-extruded-expanded with the aid of a BC-72 type CLEX-TRAL twin screw extruder having a screw diameter of 88 mm and a total processing length of 900 mm (10.2 x screw diameter).

[0039] Cooking-extrusion was carried out at 144°C under 139 bar, the two intermeshing screws rotating at 247 rpm. The mixture cooked in this way was extruded through a die having one banana shaped outlet opening or orifice. More precisely the die opening had a curved shape about 21.5 mm in length, about 3 mm in mean wideness and about 10 mm in mean radius.

[0040] The mixture was thus extruded into ambient air and immediately cut with a two blade cutter rotating adjacent to the opening at 3822 rpm.

[0041] The banana shaped bodies obtained in this way expanded after cutting to an expansion degree of about 3, that means they were about 48 mm ± 4 mm in length and of about 14mm ± 2 mm in diameter. They had a water content of about 5.5%.

[0042] The banana shaped bodies were then dried with hot air on a belt dryer to a residual water content of 0.8% before coating.

[0043] Meanwhile a slurry had been prepared which had the following composition, in % by weight of the slurry:

Banana juice concentrate	39.33%
Apple juice concentrate	13.01%
Whole milk powder (25% fat)	15.22%
Fructose	25.02%
Added water	7.42%

[0044] For preparing the slurry, the components were mixed together in a double walled tank while being heated to about 50°C.

[0045] In a tumbler 80 cm in diameter and 150 cm in length, the slurry was sprayed while still hot onto the tumbling bodies by means of 7 spray nozzles, at a rate of 125 kg of slurry for 250 kg of bodies per hour.

[0046] The freshly coated bodies were then dried with hot air on a belt dryer to a residual water content of 1.8%.

[0047] The snacks thus obtained had a dietary fiber content of 2%. They had the shape, colour and taste of banana, a smooth and crunchy texture, and they could

be eaten with the fingers by toddlers.

### Claims

5. 1. A snack to be eaten with the fingers by toddlers comprising, in % by weight of the snack, from 8 to 16% of whole milk solids, from 1 to 8% of dietary fibers and from 1.0 to 2.5% of water, and consisting of a coated body, the body being obtainable by cooking-extrusion-expansion of a mixture comprising, in % by weight of the mixture, from 8 to 16% of whole milk powder, from 3 to 5% of vegetable fat, from 35 to 50% of corn semolina, up to 30% of other cereal flour, up to 10% of cereal bran, from 20 to 30% of starch and added water up to a water content of from 13 to 18%, and the body being coated by a coating obtainable by spraying onto the body and drying a slurry comprising, in % by weight of the slurry, from 30 to 60% of a fruit or vegetable puree or concentrate, from 10 to 30% of sugar, from 10 to 25% of whole milk powder and added water up to a water content of from 20 to 30%.
10. 2. A snack according to claim 1, in which the coated body comprises, in % by weight of dry matter of the coated body, from 60 to 80% dry matter belonging to the body and from 20 to 40% dry matter belonging to the coating.
15. 3. A snack according to claim 1, having the shape of a fruit, a vegetable or a familiar item.
20. 4. A snack according to claim 1, having the shape and taste of a banana.
25. 5. A process for manufacturing a snack to be eaten with the fingers by toddlers, comprising manufacturing a body by cooking-extruding-expanding at 135 to 150°C under 130 to 160 bar a mixture comprising, in % by weight of the mixture, from 8 to 16% of whole milk powder, from 3 to 5% of vegetable fat, from 35 to 50% of corn semolina, up to 30% of other cereal flour, up to 10% of cereal bran, from 20 to 30% of starch and added water up to a water content of from 13 to 18%, coating the body by spraying thereon a slurry comprising, in % by weight of the slurry, from 30 to 60% of a fruit or vegetable puree or concentrate, from 10 to 30% of sugar, from 10 to 25% of whole milk powder and added water up to a water content of from 20 to 30%, and drying the coated body down to a residual water content of from 1.0 to 2.5% by weight.
30. 6. A process according to claim 5, comprising drying the body to a residual water content of less than about 1% before coating it with the slurry.
35. 7. A process according to claim 5, comprising cook-

ing-extruding-expanding the body to an expansion degree of from 2 to 5.

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## EUROPEAN SEARCH REPORT

Application Number  
EP 97 20 3092

## DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	WO 89 04121 A (SCHAAF HEINZ OHG) 18 May 1989 * the whole document * ---	1-7	A23L1/18
A	DATABASE WPI Week 9808 Derwent Publications Ltd., London, GB; AN 98-084894 XP002059044 N.K. ARTEMA: & RU 2 081 617 C (KUBAN PHYS CULTURE ACAD) 20 June 1997 * abstract * ---	1-7	
A	WO 94 00026 A (QUAKER OATS CO) 6 January 1994 * claims * * page 5. paragraph 2 * * page 7. paragraph 4 - page 8. paragraph 2 * * page 10. paragraph 5 * * example 3 * ---	1-7	
A	US 5 342 635 A (SCHWAB EDWARD C ET AL) 30 August 1994 * column 2. line 30 - column 30. line 36 * * column 9. paragraph 2 * * example 4 * ---	1-7	A23L
A	US 4 673 578 A (BECKER AMY J ET AL) 16 June 1987 * column 3. line 52 - column 8. line 30 * * column 9. line 2 - column 10. line 29 * ---	1-7	
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The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	16 March 1998	Vuillamy, V	
CATEGORY OF CITED DOCUMENTS		T theory or principle underlying the invention E earlier patent document, but published on, or after the filing date D document cited in the application C document cited for other reasons R member of the same patent family, corresponding document	
X particularly relevant if taken alone Y particularly relevant if combined with another document of the same category A technological background O non-written disclosure P intermediate document			



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Application Number

EP 97 20 3092

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	DE 27 12 311 A (VAASAN HOEYRYMLLY OY) 27 October 1977 * claim 1 * * page 2, paragraph 3 * * page 5 * * examples * -----	1-7	
A	US 5 250 308 A (ALEXANDER KAREN L ET AL) 5 October 1993 * column 3, line 36 - column 7, line 29 * -----	1-7	
TECHNICAL FIELDS SEARCHED (Int.Cl.6)			
The present search report has been drawn up for all claims			
Place of search  THE HAGUE	Date of completion of the search  16 March 1998	Examiner  Vuillamy, V	
CATEGORY OF CITED DOCUMENTS		<input checked="" type="checkbox"/> theory or principle underlying the invention <input checked="" type="checkbox"/> earlier patent document, but published on, or after the filing date <input checked="" type="checkbox"/> document cited in the application <input checked="" type="checkbox"/> document cited for other reasons <input checked="" type="checkbox"/> member of the same patent family, corresponding document	
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